

Fall 2013

The writing of students with Asperger's syndrome

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THE WRITING OF STUDENTS WITH ASPERGER'S SYNDROME

BY

CHRISTINE ZRIMSEK

Bachelor of Science, Elmira College, 2011

THESIS

Submitted to the University of New Hampshire

in Partial Fulfillment of

the Requirements for the Degree of

Master of Science

in

Communication Sciences and Disorders

September, 2013

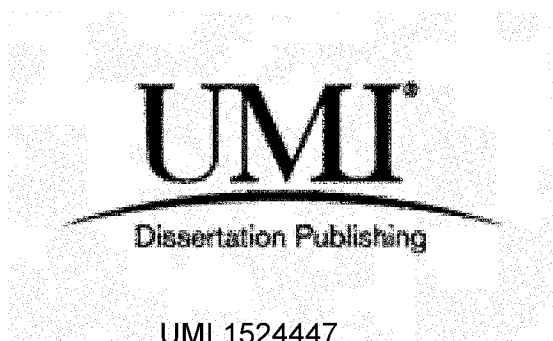
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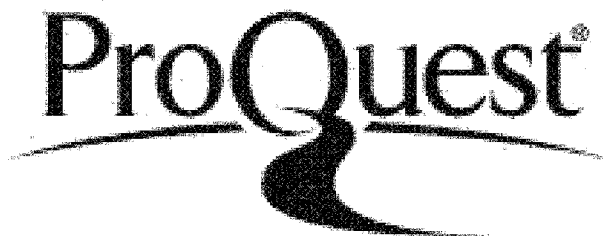


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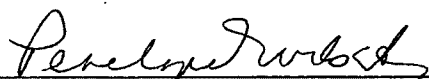
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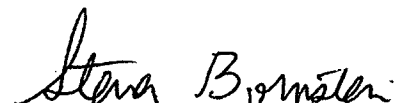
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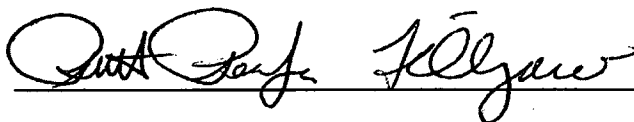
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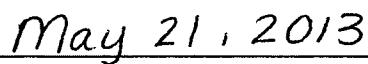
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DEDICATION

On the day of the defense of this thesis, I wore a special scarf that served as a reminder of one of the students with whom I had the pleasure of working. While only a simple piece of cloth, the memory attached to it symbolizes the many reasons I have spent the last year working on this research and the last six years studying speech-language pathology. In sitting down to write this dedication, I am again reminded of the lessons that each of my students has taught me. Each one has touched my heart and taught me something about myself either personally or professionally. This thesis is dedicated to them.

ACKNOWLEDGEMENTS

There are so many people to thank it is hard to know where to begin. First, I want to thank my thesis director, Dr. Penelope Webster. Thank you so much for helping to keep me on track, always being available to answer questions, and for reminding me to stop and breathe when I came into your office looking stressed out. I could not have asked for a better director and mentor in this process. To the other members of my board - thank you for taking the time to read and provide constructive criticism on the copious drafts I sent you. I also greatly appreciated your willingness to take time out of your already busy schedules to serve on my board. Your time and dedication is more valued than words can describe.

To my research assistants, test administrators, and those individuals who helped me recruit participants for this study - you spent countless hours helping me score essays, find participants, administer the test protocols, and most importantly, supported me throughout the whole process. I cannot begin to thank all of you enough for everything you have done for me over the last year. Please know that I could not have done this without you.

Finally, I cannot forget my family, friends, and mentors. You have always been there to support me. Thank you for helping me get through one of the most hectic years of my life and encouraging me in every endeavor I have pursued. I truly would not have been able to do this without you.

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ABSTRACT

THE WRITING OF STUDENTS WITH
ASPERGER'S SYNDROME

By

Christine Zrimsek

University of New Hampshire, September, 2013

The writing of 5 adolescent boys with Asperger's syndrome between the ages of 13 - 18 was examined relative to age and gender-matched typically-developing children. The investigator collected writing samples across three genres: narrative, expository, and persuasive. The samples were analyzed both quantitatively and qualitatively using a variety of measures. Consistent with the investigator's expectations, results indicated that, relative to controls, students with Asperger's syndrome performed significantly poorer on higher-order aspects of writing: coherence, cohesion, and perspective-taking while not significantly different on spelling, a lower-order aspect. An unpredicted finding was that the children with Asperger's syndrome made significantly more grammatical errors than their age-matched controls.

CHAPTER I

INTRODUCTION

The Oxford English Dictionary (2012) defines “writing” as “the activity or skill of marking coherent words on paper and composing text”. While this definition makes no direct reference to language, its reference to “marking coherent words” implies the impact of language skills on the writing process. Little, however, is known about the development of written language in neurotypically developing children. Research in writing’s sister skills, reading and oral language, has outlined sequences, phases, and stages in the development of these skills in neurotypically developing children. While not definite sequences, these stages delineate the expected course of development of these skills. The development of writing, however, has not been researched and documented as extensively. As a result, even less is known about the development of written language skills in special populations, specifically those in which language is the source or significant part of the disability, such as Asperger’s syndrome. To date, there is no previous research that extensively explores the writing of students with Asperger’s syndrome.

Written Language Development

In any given English classroom curriculum, a developmental sequence of how writing conventions are taught may be ascertained. In fact, research has suggested that development of written communication is a function of grade level (Crossley, Weston, McLain Sullivan, & McNamara, 2011; Freedman &

Pringle, 1980, as cited by Crossley et. al., 2011; Haswell, 2000, as cited by Crossley et. al., 2011). In general, the most common sequence of instruction begins with the most simple concepts (basic spelling and writing legible letters) and progresses towards the more complex or abstract concepts (text cohesion, syntactic structures, and cognitive strategies). Abbott and Beringer (2003, as cited by Crossley et. al., 2011) suggest that basic writing skills develop in three levels, the neural, linguistic, and cognitive levels. Each of these levels develops over the course of two to three years. The neural level begins in the first grade and goes through the third grade; during this time the finger movements required for writing develop, and children learn to handwrite letters and code orthographic information. The linguistic level is the time during which word production becomes automatic and children begin learning the structure (syntax) of written discourse which will continue developing in sophistication throughout childhood. These skills develop between the fourth and sixth grades. It is also during this level that structures of coherence in writing emerge and continue to develop well into the next level, the cognitive constraints level, which goes from grade seven through grade nine. During this level children learn and refine their abilities to plan and revise their written compositions.

Crossley et. al.'s research (2011) indicates that writing skills continue to develop beyond these three levels. Their research found significant differences in the writing of ninth grade students, eleventh grade students, and college freshmen which indicates that syntactic and lexical developments in writing

continue beyond the basic skills ascertained throughout grade school.

Additionally, they found that while the impact of the neural developmental constraints decrease in overall impact over time, challenges with the linguistic and cognitive skills continue to be constraints on students' writing throughout life.

Research has also suggested that “written language develops from inner language” (Nippold, 1988) and changes in linguistic writing skills mirror changes in children’s rhetorical styles (Durst, 1984, as cited by Crossley et. al., 2011). As such, Nippold proposes that “expressive writing develops because it has its foundation in talk [oral language]” (1988, p.109). An additional theory from Britton et. al. (1975, as cited by Nippold, 1988) suggests that children develop writing skills for a variety of functional purposes as they age from childhood to young adulthood and beyond. These researchers also suggest that writing develops along a continuum. This continuum moves from expressive writing (inner self talk regarding feelings, thoughts, and personal ideas) to writing that is transactional (academic - expository or persuasive) in nature on one end and to poetic (narrative texts such as stories and poems) on the other. It should also be noted that while writing may develop on a continuum; until the approximate age of 16, the focus of writing is on the narrative (poetic) genre of writing and a drastic shift takes place as children move towards the high-school level and the demand for transactional writing increases. Crossley et. al. (2011) describe this transition similarly. At a young age children begin writing descriptively (narrative genre); in high school, their writing becomes

interpretive or analytical (expository or persuasive genre) and in college their writing becomes more abstract.

In looking at the extensive language component present in written language, it is important to understand that all major areas of oral language development apply to written language development as well. These are: phonology (understanding that words can be broken down into smaller parts), morphology (understanding that sounds and syllables carry meaning), syntax (sentence structure), semantics (meaning of language/words), and pragmatics (social use of language). Each of these areas of oral language carries similar and important functions in written language. An additional focus in written language is the development of writing conventions (punctuation, spelling, and capitalization). These conventions also have a significant impact in the development, understandability, and quality of an individual's writing. Further, these conventions, in addition to having both a solid understanding of topic knowledge and knowledge of text development (Crossley et. al., 2011; Lin, S.J.C., Monroe, B.W., & Troia, G.A., 2007), are required to produce high quality text. Finally, adequate working memory is necessary to hold, process, and use words in written composition (Crossley et. al., 2011). The extensive working memory and vocabulary skills required to complete written tasks is thought to be another explanation as to why writing skills are a function of grade level, in that, as we learn and develop a broader vocabulary (as a function of grade level) we are able to process words more quickly.

Functional and sufficient skills in each of the above language and conventional areas are required to ensure that written text is effective and accurately conveys the author's intent. If even one of the above areas is disordered, the ability to produce high quality text is likely to be impacted.

The Characteristics and Language Abilities of Individuals with Asperger's Syndrome

Individuals with Asperger's syndrome were described, by Hans Asperger in the 1940s, as "little professors" (Volkmar & Wiesner, 2009). Asperger studied a group of boys who seemed to have a hard time forming relationships or social groups (Volkmar & Wiesner, 2009). These boys, he reported, had distinct social interaction abnormalities, tended to be clumsy, had hypersensitive tendencies, and had extremely restricted and unusual interests or preoccupations (Rhode, 2011; Volkmar & Wiesner, 2009) which were "carried out in social isolation" (Bennett et. al., 2007, p. 617). Often however, these boys had good, though eccentric, language and communication skills (Rhode, 2011). Individuals with Asperger's syndrome tend to have average to above average intellectual abilities but have difficulty understanding the minds of others (Cohler & Weiner, 2011). Essentially, they intellectualize concepts (Volkmar & Weisner, 2009) but are not always able to understand the social nature of the world and their surroundings (Brown & Klein, 2011). Specific characteristics of Asperger's syndrome may include: inflexibility in daily routine (Zukauskas, Siltan, & Baptista - Assumpção, 2009), difficulty with organizational skills required for

successful functioning in society (Rodger & Vishram, 2010), high anxiety levels (Munro, 2010), and difficulty interpreting the expressions and emotions of others (O'Connor, 2007).

Asperger's syndrome is a high functioning form of Autism. This means that it is "a chronic neurodevelopmental disorder which is presently defined by social deficits of the type seen in autism, restricted interests as [seen] in autism, but in contrast to autism, [the individual's] language and cognitive abilities [are preserved]" (Klin, Volkmar, & Sparrow, 2000). In fact, the ICD-10 Research Diagnostic Guidelines for Asperger's syndrome state that "no clinically significant general delay" in language or cognitive abilities is present in Asperger's syndrome (Klin, Volkmar, & Sparrow, 2000) as they use developmentally appropriate speech before the age of three (Bennett et. al., 2007). Some research suggests that the apparent lack of language impairment in children with Asperger's syndrome places "them on a less severe trajectory as compared to children with Autism" (Bennett et. al., 2007, pg. 617).

Nonetheless, current research suggests that, while there is "no clinically significant general delay" in language required for a diagnosis of Asperger's syndrome, there may still be some underlying delay (Colle, Baron-Cohen, Wheelwright, & van der Lely, 2007; Kamio, Robins, Kelley, Swinson, & Fein, 2007; Koning & Magill-Evans, 2001; Losh & Capps, 2003; Notredaeme, Wriedt, & Höhne, 2009; Rumpf, Becker, Becker, & Kauschke, 2012; Saalasti et. al., 2008). In fact, Saalasti et. al. (2008) found that children with Asperger's syndrome scored lower than their typically-developing peers in verbal comprehension of

instructions. They also found that their range of inaccuracy in comprehension was far broader than it was in their typically-developing same-age peers. Similarly Notredaeme, Wriedt, and Höhne (2009) found that approximately 40% of children with Asperger's syndrome in their study scored in the moderately-clearly delayed or deviant categories in receptive language (comprehension) skills. Specifically words with multiple meanings were challenging for the children with Asperger's syndrome. Koning and Magill-Evans (2001) found that while adolescent boys with Asperger's syndrome had higher receptive than expressive language scores, the difference on the receptive language measure between the boys with Asperger's syndrome and their typically developing peers was statistically significant. These researchers, similar to Saalasti et. al. (2008), found that the most significant area of difficulty was on the "Following Directions" subtest. Saalasti et. al. (2008) suggest that these verbal comprehension difficulties might be attributed to problems associated with executive functioning as well as impaired use of "inner speech" to comprehend and complete functional tasks. This, they hypothesize, might explain the difficulty these students face with both phonological processing, defined as "the processing of the sound structure of oral and written language" (Laasonen, Lehtinen, Leppamaki, Tani, & Hokkanen, 2010, p.3), and day-to-day comprehension of language (using linguistic information in context). Research also suggests that there may be some expressive language concerns as well. Notredaeme, Wriedt, and Höhne (2009) found that one-third of the participants with Asperger's syndrome in their study displayed moderately delayed or

“deviant” expressive language delays, specifically as it relates to vocabulary and grammar. Research on the verbal narrative abilities of students with Asperger’s syndrome also suggests that telling stories may be an additional area of difficulty.

Losh and Capps (2003) found that children with Asperger’s syndrome use personal narratives to relate experiences in conversation less than their typically developing peers. When they do use narratives to relate experiences, they tend to be impoverished, lacking coherence, causal language, grammatical and syntactic complexity, organization, and awareness of what needs to be relayed in the narrative (story grammar understanding). In producing these narratives, students with Asperger’s syndrome required more prompts to clarify their ambiguous statements, leaving the listener to interpret their meaning (Worth & Reynolds, 2008). Students with Asperger’s syndrome, not surprisingly, were also more likely to add extraneous or unrelated comments or sentences to their narratives. Additionally, in relating stories (rather than personal experiences) in a narrative manner, students with Asperger’s syndrome were often able to identify the main idea but offered fewer story components in their narratives. Rumpf et. al.’s (2012) research also yielded similar results. The students with Asperger’s syndrome in their study used fewer words than their peers, had a more difficult time relating the main idea of the story they were narrating, produced less referents to the internal states of the characters in the story, and had limited coherence in their narratives. Rumpf et. al. (2012) did find, however, that the phonology,

grammar, and syntax (number of different sentence structures produced) of the children with Asperger's syndrome was comparable to their same-age peers. Finally, Colle et. al. (2007) found similar results in adults with Asperger's syndrome, whose average age was 27 years. The most significant difference was that adults with Asperger's syndrome showed no significant differences in length of narrative, which the authors suspect might be the result of the more highly developed linguistic ability that comes with age.

Studying narrative discourse in this population offers a unique opportunity to look at all areas of expressive language. The results of these studies demonstrate the difficulty that students with Asperger's syndrome face with pragmatic skills such as misinterpreting peoples' intentions or expressing an opinion that requires social knowledge (Worth & Reynolds, 2008). Additionally, theory of mind, which plays a role in inferencing and understanding causal relationships (Colle et. al., 2007), and executive functioning (organizational) skills can prove quite challenging for individuals with Asperger's syndrome (Saalasti et. al., 2008). Despite the pragmatic challenges this population faces, there are also areas of linguistic strength commonly seen in this population. Based on the above research, areas that are typically strong for individuals with Asperger's syndrome include phonology, syntax (Colle et. al., 2007; Kamio et. al., 2007; Rumpf et. al., 2012), and semantics (Kamio et. al., 2007; Saalasti et. al., 2008; Worth & Reynolds, 2008). While there are several areas in which individuals with Asperger's syndrome compare with their same age peers and there are indeed several areas that are

strengths for these individuals, the areas of difficulty can create challenges in a variety of social, communicative, or academic areas. Given these difficulties with language, one might predict that individuals with Asperger's syndrome are likely to struggle in composing written text.

The Written Language of Individuals with Asperger's Syndrome

Current research suggests that writing is indeed an area of difficulty for individuals with Asperger's syndrome (Brown & Klein, 2011). Due to the complexity of oral language and the major language components (phonology - the sound system of a language (Hoff, 2009), morphology - the understanding that sounds and syllables carry meaning, syntax - sentence structure, semantics - meaning of words in a language, and pragmatics - social use of language) involved in the writing process, it is not surprising that an individual with impaired oral language development would present some difficulty conveying information through writing. Consequently, it is expected that an individual with Asperger's syndrome, a high-functioning form of Autism characterized by pragmatic impairment, would face some difficulty developing adequate written language. Brown and Klein (2011) reported that participants with Asperger's syndrome or high-functioning Autism tended to produce lower quality texts in both the narrative and expository genres, and significantly shorter narratives than did their typically developing peers.

Current research into the impact of symptoms associated with Asperger's syndrome on written language has been very limited indeed. Smith

Myles, Rome-Lake, Barnhill, Huggins, Hagiwara, and Griswold (2003) analyzed the writing of 16 students, aged 8 to 16 with Asperger's syndrome for conventions (punctuation, capitalization, handwriting) and written language concepts (spelling, syntax, morphology, vocabulary, and story grammar). They found no significant differences between groups on standardized measures of writing; however, informal analyses revealed that there were several areas of written language impacted in children and young adolescents with Asperger's syndrome. These were morphology (use of morphological markers such as plural 's' and past tense 'ed'), syntax (decreased t-unit and less complex texts) and conventions of writing (percentage of legible letters and words as well as letter alignment, spacing, formation, and size). The children with Asperger's syndrome performed lower in each of these categories than did their typically developing peers. While this data is in some ways surprising, in other ways the findings are consistent with expected outcomes. Given the tendency of students with Asperger's syndrome to follow rule based systems vigilantly, it is surprising that one of the areas in which students with Asperger's syndrome scored lower than their peers was conventions of writing, specifically since children with Asperger's syndrome often have a fascination with letters in early childhood (Volkmar & Weisner, 2009). However, given the difficulty of students with Asperger's syndrome to take the perspective of others (Volkmar & Weisner, 2009), it is not surprising that these students scored lower in areas which require them to consider what a reader already knows or needs to know to be able to understand the text at hand (such as the

use of meaningful morphological markers and the ability to compose complete, detailed texts).

Additional research by Mayes and Calhoun (2008) found that there was a 60% discrepancy between IQ and achievement scores in the writing of children ages 6-14 with Asperger's syndrome. These researchers even suggest that children with Asperger's syndrome might be considered to have a specific learning disability in writing. Brown and Klein (2011) further suggested that this significant difficulty in the area of writing is perhaps the result of limited understanding and difficulty interpreting the perspective of potential readers (theory of mind). Difficulty with theory of mind negatively affects the individual with Asperger's syndrome's ability to write about thoughts and feelings (narrative writing), respond to conversational partners with novel and pertinent information (narrative, expository, and persuasive writing), and provide sufficient but not excess information in writing to lead the reader through the composition (Brown & Klein, 2011).

Brown and Klein's (2011) research documents global writing difficulties in adults aged 17 to 42 with Asperger's syndrome. They found that writers with Asperger's syndrome tended to produce both narrative and expository texts that were of poorer quality than adults without Asperger's syndrome. The narrative, but not the expository texts were shorter in length in the adults with Asperger's syndrome than they were in the neurotypical adults. The researchers presume that this was the result of the adults with Asperger's syndrome using a structured "5 paragraph essay" format in the expository but

not the narrative text. Further, they found that the difficulty in composing narratives was related to difficulty organizing and “creating a story that fit together as a consistent whole” (Brown & Klein, 2011, p.1471), understanding the social world around them, and problems with pragmatic perspective taking. The challenge in producing expository texts, they explain, was the result of both local and global difficulty with coherence (essentially, they had difficulty focusing on the main topic and transitioning between important ideas) and difficulty anticipating the needs of their readers (knowing what information the reader needs to understand their text).

Individuals with Asperger’s syndrome often prefer literal and logical concepts (such as mathematics) over those that require interpretation and creativity (such as the composition of text) (Harbinson & Alexander, 2009). In research studying the challenges faced by students between the ages of 10 and 14 with Asperger’s syndrome in the English curriculum, Harbinson and Alexander (2009) reported that impairment in the imagination of these students negatively impacted their ability to create “imaginative” texts. They report that students with Asperger’s syndrome often became frustrated trying to compose an imaginative text as part of their English curriculum.

Purpose and Hypotheses

At this time, the researcher is not aware of any published research that has examined the ability of students with Asperger’s syndrome to compose text in the persuasive genre. This is an important genre to examine as it provides a

simple means of examining the ability of students with Asperger's syndrome to take the perspective of others. Additionally, little, if any research is available on the writing of adolescents or school-aged children, specifically adolescents between the ages of 13 and 18, with Asperger's syndrome. Finally, with such little research available, there is no clear distinction as to the aspects of written language most commonly impacted in students with Asperger's syndrome. Thus the purposes of this study were, first, to determine whether the writing of adolescents with Asperger's syndrome differs significantly from their typically developing peers and, second, whether there are patterns of strengths and weaknesses within the writing of children with Asperger's syndrome on the basis of conventions (spelling, punctuation, and capitalization), cohesion (the ability to show connections between one thought and the next while maintaining the overall rhythm of the writing), and coherence (the organization or structure of a text). A third purpose of this study was to determine whether, and if so, how, perspective-taking affects writing as reflected in the persuasive text genre.

As one of the distinctive features of Asperger's syndrome is pragmatic dysfunction, it is reasonable to hypothesize that those aspects of writing most closely associated with perspective-taking will be most affected. These include the ability to generate persuasive arguments as well as to write cohesive and coherent texts. Conventions of written language (spelling, punctuation, and capitalization) and bottom level phonological processes are expected to be the least impacted as children with Asperger's syndrome have been shown to have

a strong understanding and ability to verbally use these foundational processes (Colle et. al., 2007; Kamio et. al., 2007; Rumpf et. al., 2012; Saalasti et. al., 2008; Worth & Reynolds, 2008).

CHAPTER II

METHODS

Participants

Ten middle-school students from a local public school were recruited to form two groups: children with Asperger's syndrome (AS) and children who are typically-developing (TD). The participants from the AS group were matched to the participants in the TD group on the basis of chronological age.

Recruitment Procedures

Local high school and middle school speech-language pathologists, special educators, and school specialists in the seacoast Maine and southern and central New Hampshire areas were contacted by e-mail and letter indicating the purpose of the study and requesting aid in recruiting participants for the study (see Appendix A). Once a professional in a school had agreed to help the researcher recruit participants, a request was sent to the school's principal for permission to conduct research in that school (a sample of the letter sent to building administrators is located in Appendix A). Finally, several non-profit organizations and private clinical practices were also contacted to request referrals for any students that fit the inclusion criteria for the experimental group (see the referral letter in Appendix A).

The researcher initially attempted to recruit 10 to 20 participants per group. Referral letters and potential contact leads were followed until five

students per group were identified. Due to time constraints and the limited availability of participants, the target amount of 10 to 20 students per group was not reached. Inclusion criteria for the control group required the students to be between 13 and 18 years of age, carrying no Individualized Education Plan (IEP) or 504 plan, and have no previous writing instruction beyond that of their classroom curriculum. The control group was gender and age-matched to within plus or minus 6 months of the matched individual in the experimental group. The control group included 5 boys ranging in age from 13 to 18 with a mean age of 13. To meet the inclusion criteria for the experimental group, the student had to be between 13 and 18 years of age, have a diagnosis of Asperger's syndrome given by a qualified professional, and have no previous instruction in writing beyond that of their classroom curriculum. Additionally, these students were not currently receiving any speech-language therapy services during the school year in which the study took place. The experimental group included five boys, ranging in age from 13 to 18, with a mean age of 13. Further inclusion criteria required students in both groups to have an Intelligence Quotient (IQ) that is considered to be within average limits as determined by a review of the student's educational or clinical file by the test administrator or school contact (see Appendix A for a copy of the form used to document this file review).

Data Collection Procedures

Following a referral, the researcher contacted the parents or guardians of the student to gain written consent for their child's participation in the study. Written consent forms were sent home with students and returned to the test administrator or school contact prior to the research commencing. A copy of the consent form is located in Appendix A. The researcher then retrieved the written consent forms from the school contact. Once the researcher had collected the written consent forms from the test administrator or school contact, the test materials were distributed, which included the essay prompts and a detailed test administration protocol (see Appendix B), via e-mail to the test administrators. Prior to administering the essay prompts to students, the researcher contacted the test administrator by phone to verify that all materials had been received and that the test administration protocols were clear.

On the day of the test, all students were asked to sign a student assent form (see Appendix A). This form was read to the students by the test administrator and then collected prior to beginning the testing process. The test administrators were special educators or specialists who were recruited to administer the test during the referral process. This request was included in the referral letter (see Appendix A).

Once written parent consent and student assent were gained, the testing process began. For this study students were permitted to use their personal laptops or school computers to compose a brief written response to each of the

three essay prompts. While most previous research in writing has asked students to hand-write their essay responses, it should be noted that in this study students typed their responses to control for motor coordination differences among the students. Additionally, research suggests that students are able to better demonstrate their higher-order writing skills, such as the inclusion of appropriate content, syntax, semantics, and perspective taking, when they are not distributing their focus dually on handwriting and the composition of text (Christensen, 2004).

The prompts were the Westby and Clauser (1996) 6th grade essay prompts. Each essay prompt targeted a different genre of writing; the three genres included in this study were the narrative, expository, and persuasive genres. The prompt for the narrative genre stated: "Suppose a time machine could take you to any place at any time in the past or future. Where and what time period would you choose? Write a story about your adventure in the time and the place you have chosen." (Westby & Clauser, 1996). The aim of this prompt was to determine the students' use of story grammar. The expository prompt was used to assess the students' ability to write with the purpose of informing an audience. This prompt asked the students to select and describe the use of an invention they felt was the most beneficial invention or discovery ever made. Specifically, the prompt stated, "Many things have been invented or discovered that have made the world a better place. Think about one invention or discovery and write an essay telling what the invention or discovery is. Explain how it has made the world a better place." (Westby &

Clauser, 1996). Finally, the persuasive prompt asked the students to persuade their principal to give them more days off from school. This prompt, "Write a letter to the school principal to convince him or her that there should be more school holidays." (Westby & Clauser, 1996), allowed the researcher to look at the ability of the students to take the perspective of others and see if they were able to use that perspective to persuade the reader.

For the purpose of this assessment, the instant spell and grammar checkers on each participant's computer were turned off by the test administrator prior to the students beginning their responses. Three essay prompts were administered one at a time in the same order to all participants. The test administrator distributed a written copy of the prompt to each student and read the prompt to all students orally. The students were instructed that they would have 20 minutes to plan, compose, and revise their responses. At the end of the 20 minute session, the essays were printed, collected, and then promptly deleted by the test administrator. This procedure was followed for each of the three essay prompts.

Once all three essay responses were collected by the test administrator, the students' responses were placed in a sealed envelope. The researcher personally retrieved the essay responses from the test administrator and stored them in a locked cabinet. After the responses were retrieved they were numerically coded to ensure the confidentiality of the participants.

Each participant's essays were scored for the following analytical measures: total number of words (TNW), number of different words (NDW) or

vocabulary diversity, percentage of incorrectly spelled words, and mean length of t-unit (MLTU). A t-unit is defined as “one main clause [containing a subject and verb] and any subordinate clauses” (Hunt, 1970, as cited by Nippold, 2010). The SALT Research Version (2012) was used to calculate the total number of words and the number of different words (vocabulary diversity). The percentage of incorrectly spelled words and mean length of t-unit were calculated by the primary researcher and one other qualified researcher and was averaged for reliability purposes. The protocol used to calculate the mean length per t-unit is that of Hedburg and Westby (1993) and Nippold (2010). The Nelson and Van Meter (2007) protocol was followed in calculating the percentage of incorrectly spelled words.

Each essay was also scored against developmental writing rubrics by the researcher and two other trained research assistants who were either faculty or graduate level students in the Communication Sciences and Disorders program at the University of New Hampshire. A total of three research assistants aided in scoring all of the participants' essays. Prior to scoring the participants' essays, the primary researcher discussed the rubrics with the scorers and asked them to practice scoring using the rubrics with three sample essays. When at least 85% agreement with the primary researcher (to within plus or minus one point on the 6 or 7 point scales) was reached, the scorers were provided with coded copies of at least 50% of the participants' essays to score. The three sets of scores for each essay were then correlated for reliability.

Several rubrics were used to score the participants' essays. The "Ideas/Content", "Organization", and "Sentence Fluency" sections of the Crawford, Helwig, and Tindal (2004) abbreviated scoring rubric were used to score the essays for all three genres sampled. This six point rubric measures the coherence, cohesion, and content of a written essay. Specifically, the "Ideas/Content" section looks at the author's conveyance of the main ideas and supporting details of the text. The "Organization" (coherence) section of the Crawford, Helwig, and Tindal (2004) rubric seeks to determine the author's use of organizational devices or structures to convey the main idea of the text, and the "Sentence Fluency" (cohesion) section is used to measure the flow or rhythm of the writing within sentences and paragraphs of the text. To look at the use of story grammar in the narrative essays, Nelson and Van Meter's (2007) six point "Narrative Maturity" rubric was also used. This rubric rates the writer's descriptions of the setting and characters, sequencing of the story plot, and overall use of episode structure within a story. An additional seven point rubric to measure the persuasiveness of the students' persuasive essays (the Ferretti, MacArthur, and Dowdy (2000) scoring rubric) was also used. This rubric looks at the appropriateness of the response to a topic as well as the student's support for his or her arguments, consistency of support, and consideration of opposing viewpoints. The rubrics described above are presented in Appendix B.

CHAPTER III

RESULTS

Each student in the experimental group was matched with a same-aged peer (to within plus or minus six months) in the control group. Five matched pairs responded to prompts for the narrative and persuasive genres. One participant in the experimental group refused to respond to the expository prompt, resulting in four matched pairs for this genre. Matched pairs t-tests to determine whether the two groups differed significantly on analytic and rubric measures for that genre were conducted on the data for each pair. Quantitative and qualitative findings of the study are reported below.

Quantitative Measures

Total Number of Words (TNW)

The TNW was calculated to measure the length of students' written texts. Across all genres, the mean TNW was higher in the control group. The difference between groups was statistically significant in the narrative and persuasive genres. Tables for these and all other quantitative measures across all three genres are located below.

Number of Different Words (NDW)

The NDW measure was used to measure the variety in vocabulary used in students' writing. By convention, a higher NDW relates to a larger, more

advanced written lexical inventory (Crossley et. al., 2011). Results from the matched pair t-test indicated that the NDW was statistically greater in the control group across all three genres of writing.

Percentage of Misspelled Words

Given the hypothesis that students with Asperger's syndrome would be more likely to perform better in the lower-order versus the higher-order aspects of written language, spelling accuracy, a lower-order writing component, was measured. The results reveal that students in the control group outperformed the experimental group on this measure in the narrative genre alone. However, the percentage of misspelled words was not statistically significant between groups in any genre of writing (see Table 1).

Mean Length of Words per T-Unit (MLTU)

Mean length per t-unit was used to look at the syntactic complexity (complexity of sentence structure) of students' writing across the genres. While the experimental group on average, had larger MLTUs when they wrote in the narrative genre, the students in this group generated fewer t-units on all samples than did their typically-developing peers. A statistically significant difference in MLTU was noted in the persuasive genre in favor of the control group. As shown in Table 1, statistical significance was not achieved in the MLTU measure for either the narrative or expository genres.

Content/Ideas

The Content/Ideas section of the Crawford, Helwig, and Tindal (2004) abbreviated scoring rubric was used to measure the students' conveyance of the main ideas and supporting details of the text. As shown in Table 1, a statistically significant difference between the typically-developing students and the students with Asperger's syndrome was seen across all genres with the typically-developing students outperforming the students with Asperger's syndrome.

Organization

The Organization section, a second portion of the Crawford, Helwig, and Tindal (2004) abbreviated scoring rubric, was used to measure the students' use of organizational devices and the overall effectiveness of the structure of their texts. Again, a statistically significant difference was observed in this measure across all genres with the students in the control group outperforming the students in the experimental group.

Sentence Fluency

The Sentence Fluency portion of the Crawford, Helwig, and Tindal (2004) abbreviated scoring rubric was used to measure cohesion, or the flow or rhythm of the writing within sentences and paragraphs of the text. A statistically significant difference was not achieved in the narrative genre. However, a statistically significant difference was observed in the expository

and persuasive genres. Again, the typically-developing students outperformed the students with Asperger's syndrome in these two genres (see table 1).

Narrative Maturity

Nelson and Van Meter's (2007) six point "Narrative Maturity" scoring rubric was used to look at the use of story grammar in the narrative genre. The matched pairs t-test on this measure showed a statistically significant difference between the groups, with the typically developing students outperforming the students with Asperger's syndrome.

Persuasiveness

Finally, the Ferretti, MacArthur, and Dowdy (2000) scoring rubric was used to measure the persuasiveness of the students' persuasive essays. As table 1 indicates, the two groups differed significantly, with the control group again outperforming the experimental group.

Table 1

Narrative Genre

Variables	Control Mean	Experimental Mean	Calculated t Stat	Required t (df = 4, p<0.05)	Significance Level p<
TNW	391.6	111.8	2.74	2.776	0.052
NDW	173.6	68.2	2.65	2.776	0.046
% Correct Sp.	93.98	91.72	0.45	2.776	0.680
MLTU	15.47	21.67	0.98	2.776	0.411
Narrative Maturity	37.40	19.00	9.37	2.776	0.001
Ideas / Content	36.80	20.60	4.45	2.776	0.011
Organization	35.20	16.60	5.54	2.776	0.005
Sentence Fluency	37.00	18.60	5.34	2.776	0.006

Expository Genre

Variables	Control Mean	Experimental Mean	Calculated t Stat	Required t (df = 3, p<0.05)	Significance Level p<
TNW	394.8	67.75	2.79	3.18	0.069
NDW	177.5	46.25	3.23	3.18	0.048
% Correct Sp.	94.66	95.26	0.16	3.18	0.882
MLTU	14.63	13.03	2.32	3.18	0.103
Ideas / Content	35.25	18.35	3.30	3.18	0.046
Organization	35.50	15.75	5.67	3.18	0.010
Sentence Fluency	33.25	21.50	2.02	3.18	0.137

Persuasive Genre

Variables	Control Mean	Experimental Mean	Calculated t Stat	Required t (df = 4, p<0.05)	Significance Level p<
TNW	347.2	79.80	2.99	2.78	0.040
NDW	146.2	52.40	3.10	2.78	0.036
% Correct Sp.	95.28	92.31	0.87	2.78	0.433
MLTU	17.27	10.94	2.76	2.78	0.051
Persuasiveness	35.00	16.80	3.49	2.78	0.025
Ideas / Content	34.60	19.00	4.05	2.78	0.016
Organization	33.80	17.00	3.38	2.78	0.028
Sentence Fluency	32.80	18.00	2.69	2.78	0.055

Qualitative Measures

Given the complex nature of writing, quantitative measures, though helpful, merely skim the surface of this skill. Accordingly, the researcher paired quantitative measures with qualitative observations to gain a more complete picture of the writing of students with Asperger's syndrome.

Qualitative analysis of the data was performed as follows:

Step 1: Full writing samples were reviewed.

Step 2: Potential themes were highlighted along with supporting data.

Step 3: Patterns were assessed to answer the research questions posed in this

- study - a) How does the writing of students with Asperger's syndrome differ from those without Asperger's syndrome, and if so, how?
- b) Are there patterns of strengths and weaknesses in the writing of students with Asperger's syndrome?

c) What is the role of perspective-taking in the writing of children with Asperger's syndrome?

Narrative Genre

One significant observation made when comparing the narratives completed by both the control and experimental groups was that the students with Asperger's syndrome tended to list items or situations (plot lines) in the narrative essays without the use of transitional or causal links to the upcoming idea. This was perhaps most notable in the following essay:

I would go to the future because I would be in the national basketball accaction and be going in the nba finals and win the nba champship and the mvp 16 times and be know as the greatest player ever lived.

In contrast, the typically-developing students tended to use transitional words, temporal terms (for example: "when", "next", "finally", "after", etc.), and causal links (for example: "so" and "because") to continue the plotline. This difference, which is an indication of narrative maturity, can be seen in the following essay of one student in the control group:

If a time machine could take me any were I want in the past or future, I would go to rome in the midieval time period. I would see the coluseum and watch the gladiator games, visit the emperor of that period of time, and then I would learn to ride horses with the friends I have made. I would then see if I could join in the gladiator games and win the crowd. Next I would visit the counsil and talk politics for a pretty long time. Later that night I will eat well with fruits and vegetables and nice chicken, I would farm for corn and vegetables on a farm just to help out the farmers because I enjoy helping people (it is very fun). Then after all that fun I would get back in my time machine and take a joyful ride home. When I get back I would take a whole week out of my time just to tel all of my best friends what happend on my trip to tome in a time machine.

Another notable contrast in narrative production was the complexity of the vocabulary used. A sample of the most complex vocabulary in each group of stories was collected; this sampling revealed that the typically-developing students, on average, tended to use more complex terms in their writing. For example, students in the control group used vocabulary such as “victorious”, “punted”, and “medieval” and demonstrated understanding of those terms in their essays. In contrast, students with Asperger’s syndrome used vocabulary such as “multiple”, “association”, and “president”, but did not necessarily provide context clues that suggested they were fully understanding the vocabulary they were using. For example, “association” was used as part of a proper name (National Basketball Association).

Although the perspective-taking ability of students was not measured analytically in the narrative genre of writing, several instances of perspective-taking, specifically altruistic motives, were noted in the stories of typically-developing students. This is in contrast to the experimental group, in which the ability to take the perspective of others was noted in only two instances. In both cases, students mentioned concern for others but failed to delve deeper into the explanation of the emotions of the characters in their stories. This finding contrasts the essays of the typically-developing students, who demonstrated four instances of altruistic motivation in their writing.

The narratives referenced above clearly demonstrate the contrasting ability of typically-developing students to take the perspective of others as

compared to the students with Asperger's syndrome. Interesting to note is that the majority of students in the control group wrote that they wished to go back in time to see what life was like in the past or attempt to change something that happened in the past. In contrast, the majority of students with Asperger's syndrome tended to desire to go forward in time to "see" what their lives would be like in the future. Again, though this observation was not apparent in all students in each group, it does suggest that students in the control group were able to take the perspective of others in their writing, and that students in the experimental group tended to have a narrower focus (demonstrating difficulty with perspective-taking skills) in their narrative writing.

Several other higher-level language skills were observed in the writing of the control group which were absent in the writing of students with Asperger's syndrome. One such higher-level language skill was the presence of dialogue. Forty percent of children in the control group incorporated dialogue. Additionally, appropriate punctuation was used to set the dialogue apart from the rest of the text. In contrast, dialogue was not used correctly by any of the students in the experimental group. An additional difference between the two groups was the use of higher-level figurative language in the writing of the typically-developing students. Idiomatic phrases such as "in a jiffy" and the use of multiple meaning words (homographs) in phrases such as "dish out 7 assists" were observed in several of the narrative stories written by the control group. These higher-level language skills were not observed in the writing of students with Asperger's syndrome.

A final pattern observed was that the percentage of correctly spelled words tended to be lower in the narrative genre than in any other genre. This was present across both groups and may be a function of the amount of writing generated.

Expository Genre

One of the most significant patterns noted in the expository genre is that the group of students with Asperger's syndrome wrote significantly less than their age-matched peers. In this genre, the control group produced structured paragraphs, and in two instances, traditional five-paragraph essays which were comparable in length to their essays in the other genres of writing. This was quite different from the one to two sentence essays most frequently observed in the expository writing of the students with Asperger's syndrome. Presented below is one example of an introductory paragraph written by a typically-developing student in response to the prompt, "Many things have been invented or discovered that have made the world a better place. Think about one invention or discovery and write an essay telling what the invention or discovery is. Explain how it has made the world a better place."

There have been many helpful machines invented through out history, but There is one machine that has hellped out the most. The car, the automobile, has helped many people around the world. It is also a way of employment for many people who are experienced. The automobile has helped the average human travel to many places from cross country rides to just a short ride through the park. I think the automobile is the most important machine of all.

This student follows his introduction with paragraphs that expand upon these ideas and even identifies why others might disagree with his rationale. While this essay was not meant to be persuasive but rather informative in nature, this student, much like the majority of students in the control group, demonstrated reader awareness by using supporting details (explaining his rationale and providing information, rather than simply stating his opinion) and addressing the potential opinions of others in his writing. In contrast, the students with Asperger's syndrome tended to state their opinions and a contradictory "general fact" but failed to provide adequate supporting details. An example essay is presented here:

Wood because if we did not have wood then we would not have homes, Or we couldn't even make a fire in the fire place. So then we would be cold at night.

Commensurate with the vocabulary used in the narrative essays, the typically-developing students, on average, tended to use higher level vocabulary than did their peers with Asperger's syndrome. Students in the control group used vocabulary such as "blueprints", "cyber bullying", and "carbon monoxide" as compared to their peers in the experimental group who used vocabulary like "technology", "wood", and "anti-toxins". In this genre, it was noted that both the experimental and control groups' highest-level vocabulary items were most often nouns. However, in the narrative and persuasive genres, the control group tended to use higher-level vocabulary in many different parts of speech (adjectives, verbs, adverbs, and nouns). In

contrast, the students with Asperger's syndrome used nouns as the word class with the most maturity across all genres.

Students in both groups tended to identify similar concepts in their essays, such as technology and electronics. All students in the control group identified an invention. In the group of students with Asperger's syndrome, two students (40%) identified natural resources. While these were acceptable answers to the prompt, these students failed to identify (or identified, but with minimal supporting detail) how these natural resources (discoveries) have made the world a better place. Instead, they simply stated their opinion and explained what is done with those resources (as in the essay about "wood" presented above).

Persuasive Genre

Students were asked to write a persuasive letter because this genre affords a closer look at perspective-taking. Of interest was the students' ability to identify with a particular group or opinion as well as to consider and reference the viewpoints of others in writing.

A clear pattern observed was the amount of text generated. Students in the control group were more likely (60% of essays) to write more than one full paragraph in their letters. None of the students with Asperger's syndrome wrote more than one paragraph in their letters. This finding is likely related to an additional observation that students in the control group tended to cite specific (and often personal) examples and arguments to support their request.

These specific examples in addition to the significant amount of supporting detail provided made their letters more persuasive in nature.

As can be seen below in the persuasive letter of a student in the control group, specific examples and arguments are brought together to convince the reader to take the writer's point of view.

Dear _____. _____,

Hello, my name is _____ and I am writing to you to introduce my opinion that there should be more school holidays. In speaking for most of the student body, I say that allowing us to receive more days off will lessen the stress of each school day considerably. Going to school for 180 days over 9 months can be tremendously tiring at times, and can even be sickening. Receiving more school holidays, or days off, would allow students to come to school more motivated, less tired, and ready to learn.

In my experiences with kids at my school, most of them are often yawning and putting their heads down in classes. This then starts a chain reaction of the teacher getting angry, which takes up class time. Is that really what should be happening? I don't really think it would be happening if we had more time, maybe an extra day a week, to spend resting and taking the day off. Like I said, there would be much more motivation for students and teachers.

Yes, I know that there are drawbacks to this plan, and I know that kids need 180 days to be in school and learn. However, I am willing to say on behalf of the students that we will stay an extra hour each school day to allow more class time. This might not make up all of the extra school holidays, but I believe it will give us enough time to learn the curriculum given. Also, I think teachers might like this plan too, because it will allow them more time to make interesting lesson plans, and be more creative with what goes on in class. Since a lot of my friends are in band, I am thinking about how it will effect the music department. I believe it would be a positive contribution to them, too. It would allow them more time to practice with their instruments, and would give them more time to study music.

As you can see, there are many positive things that more days off of school could do for everybody. Students would get rest and gain motivation, and teachers could greatly improve and spice up their lesson plans. The music department would benefit from more days off. It is obvious that there would be an overally better environment at schools

everywhere. Please consider my plan and get back to me on what you think.

Sincerely,

The essays of the typically-developing children and children with Asperger's syndrome were analyzed for indications of perspective-taking in response to the prompt, "Write a letter to the school principal to convince him or her that there should be more school holidays." One of the salient features noted was that all students seemed to identify themselves within a group (students of their school or class). Further, all typically-developing students referenced other points of view, such as the potential views of other students, teachers, and the principal. In fact, two typically-developing students referenced a principal and/or teacher's point of view directly. While all students with Asperger's syndrome referenced the potential view points of other students, their references tended to be indirect or vague. Only one student referenced a potential teacher's perspective, and this was done indirectly.

Use of negotiation, an indication of advanced ability to consider the perspective of others, was another pattern identified. In taking the perspective of others (either referencing it directly or mentioning suggestions for dissenters) 80% of students in the control group cited extended school days to make up for adding additional holidays to the school calendar. This ability to consider the perspective of the principal and derive a compromise (negotiation) so that both parties "win" made the essays of these students

much more persuasive. In contrast, none of the students with Asperger's syndrome used negotiation skills, and, as previously mentioned, in most instances failed to reference points of view beyond that of their own. In fact, four of the five students with Asperger's syndrome either wrote a list of demands, with little or no support to persuade their reader, or stated their opinion with limited support. One example of this is presented below:

Dear principal,
We could have everyday off from school
Sincerely _____

One of the most salient characteristics noted (not related to perspective-taking) in the persuasive letters was the use of letter structure. Four of the five (80%) essays written in each group (both control and experimental) were written using traditional letter form (greeting, body, closing).

CHAPTER IV

DISCUSSION

The purpose of this study was threefold. The first was to determine whether the writing of adolescents with Asperger's syndrome differs significantly from that of typically-developing adolescents. The second was to learn whether there are patterns of strengths and weaknesses in the writing of this population on the basis of writing conventions, cohesion, and coherence. The third purpose was to determine the effects of perspective-taking, or theory of mind, on writing.

Prior research has identified writing as an area of weakness for children with Asperger's syndrome. The writing difficulties identified in previous studies include a range of problems, many of which may be connected to a lack of consideration for the reader's needs (audience awareness). In the present investigation, it was expected that students with Asperger's syndrome would show relative strengths in the lower-order, rule-based aspects of writing, which include spelling and grammar, and relative weaknesses in the higher-order aspects, which include coherence, cohesion, and perspective-taking. This prediction was based on prior published work which indicates that this population is inclined to follow rule-based systems heedfully, while struggling with those aspects of communication and that require a keen theory of mind.

Results of the present study indicate that, consistent with the above expectation, higher-order aspects of writing are indeed affected in writers with Asperger's syndrome. Their performance on these variables is significantly

poorer than that of their age-matched peers. The finding that the children with Asperger's syndrome performed very similarly to typically-developing peers in spelling, which is phonologically, morphologically, and orthographically rule-based, is likewise consistent with expectations. An unpredicted finding, however, was that the children with Asperger's syndrome performed significantly poorer on grammar, defined as proper use of capitalization, punctuation, and subject-verb agreement in full sentences, which is a rule-based, lower-order writing component. This was observed in both qualitative and quantitative forms of analysis. One possible explanation for this unpredicted finding is that writing requires executive management of a number of different functions simultaneously. Given the higher incidence of organizational difficulties in this population, it is reasonable to speculate that control of grammar during the act of composing text may take a back seat to other processes in demand.

Both quantitative and qualitative analyses show that adolescents with Asperger's syndrome, relative to their typically-developing peers, produce text in the narrative, expository, and persuasive genres that is: impoverished in length, contains a greater proportion of nonspecific vocabulary, contains a greater proportion of grammatical errors, is less cohesive and coherent, and is less considerate of the reader. Further, their knowledge of text structure, as evidenced in the ability to write text in letter format, story grammar, and expository format, is weak.

The role of perspective-taking in writing has not been examined extensively to date. While it is clear that the ability to consider the needs of the reader is paramount in the composition of clear, unambiguous, and lively text, it is less clear to what degree this ability must be in place. In studying writers with limitations in perspective-taking, it may be possible to learn more about the role of this ability in writing. An additional purpose of the present investigation, therefore, was to closely examine the ability of children with Asperger's syndrome, a population who characteristically has difficulty in this area, to compose persuasive text.

Persuasive writing was chosen for the evaluation of perspective-taking because it is a form of text that requires the writer to consider the point of view of the reader in order to make a convincing argument. In other words, the writer must offer, in addition to his or her own reasons and opinions, reasons why the proposed plan, action, etc. is worthwhile for the reader. The participants with Asperger's syndrome, in contrast to the typically-developing participants, demonstrated difficulty with this task, often flatly stating an opinion and then providing only one or two supporting facts. In most instances, the writers with Asperger's syndrome provided egotistical statements and failed to offer statements that brought the reader's point of view into the situation. In contrast, the students in the typically-developing group, in the majority of cases, wrote complete, well-supported arguments that brought the needs and views of their readers into the equation. Negotiation, a higher-order cognitive skill is part of persuasion in both oral and written domains. In the

writing of children with Asperger's syndrome, negotiation attempts were absent. This has import for their ability to compose mature written discourse required in advanced level classes, and is consistent with their difficulty in oral discourse.

It was expected that the children with Asperger's syndrome would be particularly challenged by the persuasive writing task, and, as a result, their performance in other aspects of writing, such as number of words, mean length of t-unit, etc. would be hampered in this genre. Results do not support that prediction. While their writing was indeed compromised, the data do not indicate that their writing in other aspects was more compromised in this genre than in the others. One reason for this may be that they did not recognize the true objective of the persuasive essay (to convince the reader), and therefore, did not suffer a reduction in attentional resources for this writing task. Their MLTU was not significantly lower in this genre than the other two, indicating that their use of complex syntax and subordination was not unusually hindered by the cognitive complexity of the task.

In addition to writing persuasive arguments, other means of evaluating perspective taking in writing were applied in this study. The difficulty of students with Asperger's syndrome in considering reader perspectives was evident in the narrative genre, for example. Specifically, their stories were impoverished in detail and failed to provide casual links from action to action in a given sequence. This suggests that these students may not have recognized when pertinent information was missing in their work. In contrast, the

typically-developing students wrote detailed, causally-linked narratives that, on average, used more elements of story grammar than those of the students with Asperger's syndrome.

Similar results were seen in the expository genre. The prompt for this genre asked the participants to state their choice of an important invention, buttressed by details. While the typically-developing students often cited the benefits of the chosen discovery to a broader population, those with Asperger's syndrome tended to provide only one or two self-centered details or explanations. These writers focused on the reasons the invention was important to them. They neglected to show why the invention was important to the broader society. As with the persuasive genre, these students showed difficulty considering the perspective of others in their compositions.

An interesting observation was noted when the performance of the students with Asperger's syndrome was compared across all three genres of text. Surprisingly, in most of the quantitative and qualitative measures, students with Asperger's syndrome performed most poorly on the expository genre of writing. This was rather unexpected as the expository genre requires the least amount of perspective-taking of the three genres, which is one of the areas of writing most impacted by Asperger's syndrome. This genre tends to be more concrete in nature, in that, it requires the writer simply to inform the reader. Given the restrictive, repetitive, interests and patterns of behavior that are characteristic of Asperger's syndrome, it was surprising that, when allowed to select a topic to write about (within the confines of the prompt),

these students had difficulty writing text to inform the reader of a topic they were interested in and thus, likely, knowledgeable about. The smaller sample size for this genre may have affected these results.

The narrative was the genre that appeared to be least impacted in the group of students with Asperger's syndrome. While narrative text writing requires perspective-taking skills, it is also the genre in which students have likely had the most exposure. It is reasonable to speculate that their better performance may be the result of students having greater exposure to narrative text, thereby enabling them to use more of the required elements of that genre. However, despite their relative strengths writing narratives, even in this genre, students with Asperger's syndrome still struggled with both lower and higher-order written language skills.

Clinical Implications and Suggestions for Future Research

The following clinical implications emerge from the results of this study. First, while intact linguistic abilities (abilities commensurate with that of their typically-developing peers) are a hallmark of Asperger's syndrome, the results of this study indicate that in the linguistic skill of written composition, students with Asperger's syndrome fall significantly below their typically developing peers. Such findings indicate the need to closely monitor these students' development of writing skills.

If progress is closely monitored, it is possible to identify and diagnose problems when they arise, specifically, what areas of writing are most

impacted. Proper identification of these problems before or soon after they occur is crucial. Prior research has indicated that writing develops over the course of many years. Because writing skills have the potential to continue developing well into the college years, early identification and intervention with this population is key.

Intervention in writing for students with Asperger's syndrome should be tailored to target specific problem areas whenever possible. Because Asperger's syndrome is a well-defined diagnosis with specific criteria, it may lead to false assumption that students with Asperger's syndrome demonstrate similar difficulties across skill sets. Although the students with Asperger's syndrome in the present study did share some similarities, such as impaired perspective-taking, and a tendency to write less advanced or impoverished texts, these students, much like their typically-developing peers, demonstrated varied patterns of strengths and weaknesses. Determining individual patterns of strengths and weaknesses is important in the design and implementation of programs that are specially designed to meet the individual needs of each student.

Future research should include studies on a larger, more geographically diverse scale, specifically targeting both genders and a broader age range. Additionally, further research is needed to determine the most efficacious interventions targeting both higher and lower-order areas of written language in children with Asperger's syndrome.

Limitations of the Study

This study is limited in three areas. First, because of the strict inclusion requirements, only a small sample of students could be obtained. The expository genre was even further restricted by this variable. This limited the generalizability of this study since there was only a small pool of data from which to draw conclusions. On the other hand, however, the fact that statistical significance was reached on most variables tested with such a small sample indicates that differences were strong.

A second limitation was that all participants were from a single geographic location. Because the sample represents only a small portion of the target population, this factor limits the generalizability of these results to the broader population of students with Asperger's syndrome. The participants in this study were not only drawn from the same geographic location, but also from the same educational institution. The potential effects of educational instruction were therefore not controlled.

Finally, the decision to use computer word processing rather than handwriting in the collection of the writing samples is a limitation, as it is difficult to directly compare the present results with those of prior studies in which handwriting was the chosen mode of output. In addition, the participants' degree of facility in keyboarding was not documented. This is important because keyboarding facility may affect the writer's ability to devote processing resources to writing factors such as coherence, cohesion, and audience needs. The decision to use keyboarding was based on previous

research that suggests that typing essays rather than handwriting them allows students to focus on higher-order rather than lower-order skills, such as handwriting. This study would have been strengthened, however, by documentation that all participants were at similar levels in this skill.

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APPENDICES

RECRUITMENT MATERIALS

1. Referral Letter



UNIVERSITY of NEW HAMPSHIRE

Date: November 27 , 2012

To whom it may concern,

My name is Christine Zrimsek; I am a second year graduate student in the communication sciences and disorders program at the University of New Hampshire. I am currently in the process of completing a thesis research project on the writing of adolescents with Asperger's syndrome under the supervision of Dr. Penelope Webster Ph.D. CCC-SLP. I am writing today to ask if you would consider the students you work with and refer any you feel may meet the inclusion criteria.

At this time I am looking for students for the experimental group who are between the ages of 13 and 18, have been diagnosed with Asperger's syndrome by a qualified provider, and who have received no additional instruction in academic writing beyond what has been taught in the classroom environment. The referred students, once permission is granted, will be asked to write three short essays based on preselected prompts that will each require up to but no more than 20 minutes time to complete. For the control group I am simply looking for several students between the ages of 13 and 18 carrying no IEP or 504 plans and having no previous instruction in writing beyond that of the regular classroom curriculum.

If you feel that you have any students who may fit the above criteria and would be willing to refer students for this project, I would greatly appreciate your referral. All I request, in order to maintain confidentiality, is that you be willing to distribute and collect the parental consent forms and I will schedule a time to retrieve them from you at a later date. Once I receive permission from your school's administrator, I will send a packet containing the parent consent forms.

Additionally, in order to collect data at a convenient time for students (such as a study hall or other free period) I was wondering if either you, your school's speech pathologist, classroom teacher, or special educator within your student's school/organization might be willing to donate one hour of time to help me collect the data by administering the essay prompts. Before administering the essay prompts I would schedule a brief meeting or phone conference to go over the administration protocol with the individual administering the prompts. Additionally, I will provide written instruction and all documents required to complete the test protocol. If you

would be willing to administer these brief prompts to your student or a group of students in your school/organization or believe there is another individual who would be interested and willing to do so, referral to this individual would be appreciated as well!

If you would be willing to be a referral source or could suggest any other or additional sources, I would greatly appreciate it! I can be reached at cey77@wildcats.unh.edu or at 603-781-7699 to answer any questions you may have. Thank you so much for your time!

Sincerely,

Christine Zrimsek
Graduate Student Researcher –
University of New Hampshire

2. Building Administrator Letter

Dear **[Academic Building Administrator]**,

My name is Christine Zrimsek, I am a graduate student in the Communication Sciences and Disorders department at the University of New Hampshire. I am writing to tell you about a research study looking at the writing of children with Asperger's syndrome. **[Name of Speech Language Pathologist or Special Educator]** has expressed interest in participating in the study and helping me recruit student participants in your school.

The purpose of this research is to determine the areas of strength and difficulty in the writing of adolescents with Asperger's syndrome. The benefits of the knowledge gained from this study are expected to be critical in designing new and improved writing intervention strategies for children with Asperger's syndrome. The study will require the students to write three short essays, each taking no more than 20 minutes to complete. **[Name of SLP or Special Educator] is willing / believes that she has found someone who** would be willing to administer these brief tests at a time of the school day that is convenient for the student and should not take away from classroom instruction. Because the tests are very brief, these essays could be easily completed during a study or free period or as a part of an English Language Arts course. The results of this study will be used in reports, presentations, and publications.

As this research would be taking place in your academic building and with students in your school, I require your knowledge of the research and permission for the study to occur in full. At the conclusion of this letter, you will find a place to sign that will signify your knowledge and approval of this research.

I seek to maintain the confidentiality of your students' personally identifiable information. I will store the information in a locked cabinet and only the **[SLP or Special Educator]** from your school and I will have access to any personally identifiable information. Other data scorers will receive coded documents for scoring purposes. There are, however, rare instances when I am required to share personally-identifiable information (e.g., according to policy, contract, regulation). For example, in response to a complaint about the research, officials at the University of New Hampshire, designees of the sponsor(s), and/or regulatory and oversight government agencies may access research data. Additional instances in which I or the test administrator would be required to report personally identifiable information are in cases of child abuse, neglect, and threatened violence to self or others. The collected data will be reported in an aggregated (grouped) manner and no personally identifiable information that could link your child to the study will be reported.

I thank you in advance for reviewing this document and looking forward to speaking with you about my study. Please feel free to contact me at 603-781-7699 if you

have any further questions, concerns, or if you require more clarification of my request for permission. I will conduct a follow-up phone call to ensure delivery of this letter.

Sincerely,

Christine Zrimsek, B.S.
Graduate Student Researcher

I, _____ have read the previous information thoroughly and GIVE PERMISSION to allow this research study to take place at (Name of school).

Signature of Building Administrator

Date

Title / Role

3. Consent Form



UNIVERSITY of NEW HAMPSHIRE

Date: October 17, 2012

Dear Parent,

My name is Christine Zrimsek. I am a second year graduate student at the University of New Hampshire in the Communication Sciences and Disorders program and I am conducting a research project looking at the writing of students with Asperger's syndrome. I am writing to invite your child to participate in this project. I plan to work with approximately 20 to 40 students both who have and do not have diagnoses of Asperger syndrome in this study.

If you agree to allow your child to participate in this study, he/she will be asked to write three short essays based on three specific essay prompts that I will administer these prompts to your student at a mutually selected time. Neither you nor your child will receive any compensation to participate in this project.

The anticipated risks associated with participation in this study are minimal, if any. It is possible, though unexpected, that students may feel some stress in completing the assessment or fatigue in completing an hour of testing, particularly if they do not enjoy writing or are uncomfortable writing for an unfamiliar audience. Although your child is not anticipated to receive any direct benefits from participating in this study, the benefits of the knowledge gained are expected to be critical in designing new and improved writing intervention strategies for children with Asperger's syndrome.

Participation in this study is strictly voluntary; your refusal to allow your child to participate will involve no prejudice, penalty, or loss of benefits to which you or your child would otherwise be entitled. If you agree to allow your child to participate, your child may refuse to answer any question and you or your child may withdraw participation at any time during the study without penalty.

I seek to maintain the confidentiality of all data and records associated with your child's participation in this research. Only a small number of people will have access to the data. Only your child's teacher or other associated professional (the test administrator) and I will have access to the original data. Any individuals aiding in the data analysis process (my faculty advisor, Dr. Penelope Webster, and one or two research assistants, other UNH graduate students) will have access to the student's writing, which will be coded and no identifying information will be provided. There are, however, rare instances when I am required to share personally-identifiable information (e.g., according to policy, contract, regulation). For example, in response to a complaint about the research, officials at the University of New Hampshire, designees of the sponsor(s), and/or regulatory and oversight government agencies may access research data. Additional instances in which I or the test administrator would be required to report personally identifiable information are in cases of child abuse, neglect, and threatened violence to self or others. The collected data will be reported in an aggregated (grouped) manner and no personally identifiable information that could link your child to the study will be reported. The results of this study will be used in reports, presentations, and publications.

If you have any questions about this research project or would like more information before, during, or after the study, you may contact me, Christine Zrimsek, at 603-781-7699 or cey77@wildcats.unh.edu . If you have questions about your rights as a parent of a research subject, you may contact Dr. Julie Simpson in UNH Research Integrity Services at 603-862-2003 or Julie.simpson@unh.edu to discuss them.

I have enclosed two copies of this letter. Please sign one indicating your choice and return in the enclosed envelope. The other copy is for your records. Thank you for your consideration.

Sincerely,

Christine Zrimsek

Graduate Student Researcher – University of New Hampshire

Yes, I, _____ consent/agree to allow my child to participate in this research project.

Child's Name

Child's D.O.B

Child's Grade

Gender

Please check one box in order to ensure that your student is included in the appropriate research group:

☐ I certify that my child carries a diagnosis of Asperger's syndrome, and has had no instruction in writing beyond that of the regular classroom curriculum.

☐ I certify that my child does not carry an IEP or 504 plan, and has no writing instruction beyond that of the regular classroom curriculum.

No, I, _____ do not consent/agree to allow my child to participate in this research project.

Signature

Date

4. Assent Form



UNIVERSITY of NEW HAMPSHIRE

ASSENT FORM FOR PARTICIPATION IN A RESEARCH STUDY

My name is Christine Zrimsek. I am a second year graduate student at the University of New Hampshire in the Communication Sciences and Disorders program. I am conducting a study on writing skills in adolescents. Some of the 20 - 40 students I plan to work with will have Asperger's syndrome, some will not.

If you decide to participate in this research study, a teacher will ask you to write three short essays. All together writing these three short essays should take one hour. These essays will be given either during an English class or study hall in so that you do not miss out on other school work.

The risks associated with participation in this study are small, if any. It is possible that you will feel some stress in completing the essays or become tired doing an hour of writing. Although you will not receive any direct reward from participating in this study, however, the information learned in this study are expected to help design new writing strategies for students with Asperger's syndrome.

Your participation in this research is optional, and refusal to participate will not involve any negative consequences (prejudice, penalty or loss of benefits to which you would otherwise be entitled). If you agree to participate in this study, you may refuse to answer any question and/or stop participating at any time without any negative consequences (prejudice, penalty, or loss of benefits to which you would otherwise be entitled).

I will do my best to maintain the confidentiality (privacy) of all records associated with your participation in this research. Only a few people will be able to read your essays. Only your teacher and I will know your name and personal information. Any

individuals helping me with my study (my advisor, Dr. Penelope Webster, and one or two research assistants, other graduate students) will have access to your essays. The copies of your essays that they will receive will be numbered and no information that could link you to the study will be provided. There are, however, rare situations in which I would be required to share personally-identifiable information (e.g., according to policy, contract, or regulation). For example, in response to a complaint about the study, officials at the University of New Hampshire, designees of the sponsor(s), and/or regulatory and oversight government agencies may access your essays. Additional situations in which I would be required to report personally identifiable information are in cases of child abuse, neglect, and threatened violence to self or others. The collected data will be reported in an aggregated (grouped) manner and no personally identifiable information that could link you to the study will be reported in publications or presentations.

If you have any questions about this research project or would like more information before, during, or after the study, you may contact me, Christine Zrimsek, at 603-781-7699 or cey77@wildcats.unh.edu . If you have questions about your rights as a research participant you can contact Dr. Julie Simpson in UNH Research Integrity Services, 603-862-2003 or Julie.simpson@unh.edu to discuss them.

I, _____ CONSENT/ AGREE to participate in this research study.	I, _____ DO NOT consent/agree to participate in this research study.
--	--

Signature of Subject

Date

5. Demographic Information Collection Sheet

Participant Demographic Data

Student Name: _____

Date of Birth: _____ Grade: _____

Gender (circle one): Male Female

Please check any of the following boxes that apply.

- ☐ This student's intellectual functioning is considered to be within the average range.
- ☐ This student has a diagnosis of Asperger's syndrome given by a qualified professional.
- ☐ This student has had no additional instruction in writing beyond that of his/her regular classroom education.
- ☐ This student carries no IEP or 504 plan.

For researcher use
only:

Student Code: _____

6. IRB Approval Letter

University of New Hampshire

Research Integrity Services, Service Building
51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

28-Sep-2012

Zrimsek, Christine
Communication Sci and Dis, Hewitt Hall
24 Rocky Hill Road
Somersworth, NH 03878

IRB #: 5549

Study: The Writing of Children with Asperger's Syndrome

Approval Date: 19-Sep-2012

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved the protocol for your study with the following comments:


~ Before starting the study in a school, the researcher needs to submit to the IRB a letter from the principal giving permission for the study to take place in the school and receive a response from the IRB giving approval for the study to start in that site before a clinician/teacher may recruit parents.

Approval is granted to conduct your study as described in your protocol for one year from the approval date above. At the end of the approval period you will be asked to submit a report with regard to the involvement of human subjects in this study. If your study is still active, you may request an extension of IRB approval.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the attached document, *Responsibilities of Directors of Research Studies Involving Human Subjects*. (This document is also available at <http://unh.edu/research/irb-application-resources>.) Please read this document carefully before commencing your work involving human subjects.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,


Julie F. Simpson
Director

cc: File
Webster, Penelope

TEST ADMINISTRATION MATERIALS

1) Written Test Administration Protocol

Test Administration Protocol

- 1) Distribute student assent forms.
- 2) Instruct students to listen carefully and follow along as you read the assent form to them aloud.
- 3) Instruct students: "Please read the boxes carefully and print your name in one of the box of your decision and sign your name on the line below."
- 4) Collect all assent forms.
- 5) Ask the students to take out their personal laptops and open Microsoft Word.
- 6) Please turn off the spelling and grammar check options. The instructions are provided below:

- Click on the Microsoft Office button at the top left of the screen.
- Select "Word Options" from the bottom of the drop down menu, it will be located on the bottom right of this menu.
- Select "Proofing"
- Uncheck all boxes in the "When checking spelling and grammar in Word" section

- 7) Have the students type their name at the top of a blank document with an "A" beside it.
- 8) Distribute the copies of the Narrative Prompt (Prompt A). Read the prompt out loud to the students. Instruct them: "You will have 20

minutes to complete your response to this question. You may begin, now.”

- 9) At the end of 20 minutes, instruct students: “Please stop and send your document to the printer (identify the printer being used).”
- 10) Collect the responses from the printer and place in the provided envelope.
- 11) Instruct students to open another blank word document.
- 12) Have them type their name at the top of the paper with a “B” beside it.
- 13) Distribute the copies of the Expository Prompt (Prompt B). Read the prompt out loud to the students. Instruct them: “You will have 20 minutes to complete your response to this question. You may begin, now.”
- 14) At the end of 20 minutes, instruct students: “Please stop and send your document to the printer (identify the printer being used).”
- 15) Collect the responses from the printer and place in the provided envelope.
- 16) Instruct students to open one final blank word document.
- 17) Distribute the copies of the Persuasive Prompt (Prompt C). Read the prompt out loud to the students. Instruct them: “You will have 20 minutes to complete your response to this question. You may begin, now.”
- 18) At the end of 20 minutes, instruct students: “Please stop and send your document to the printer (identify the printer being used).”

- 19) Collect the responses from the printer and place in the provided envelope.
- 20) Once 3 responses from each participant have been collected, please seal the envelope.
- 21) Have students delete all essay responses before leaving the room.

2) Essay Prompts

Essay Prompts	
Narrative	Suppose a time machine could take you to any place at any time in the past or future. Where and what time period would you choose? Write a story about your adventure in the time and place you have chosen.
Expository	Many things have been invented or discovered that have made the world a better place. Think about one invention or discovery and write an essay telling what the invention or discovery is. Explain how it has made the world a better place.
Persuasive	Write a letter to the school principal to convince him or her that there should be more school holidays.

3) Developmental Scoring Rubric(s)

Crawford, Helwig, and Tindal (2004)

Abbreviated Scoring Rubric

Ideas/Content

- 6 - Exceptionally clear, focused, and interesting. Writing holds the reader's attention throughout. Main ideas stand out and are developed by strong support and rich details suitable to audience.
- 5 - Clear, focused, and interesting. Writing holds the reader's attention. Main ideas stand out and are developed by supporting details suitable to audience.
- 4 - Clear and focused. Reader can easily understand the main ideas. Support is present, although it may be rather general.
- 3 - Reader can understand main ideas, although they may be overly broad or simplistic. Detail is often limited, insubstantial, overly general, or occasionally off topic.
- 2 - Main ideas and purpose are somewhat unclear, or development is attempted but minimal.
- 1 - Writing lack a central idea or purpose. Paper is too short to develop ideas.

Organization

- 6 - Organization enhances the central idea and its development. Order and structure are compelling and move the reader through the text easily.
- 5 - Organization enhances the central idea and its development. Order and structure move reader through the text.
- 4 - Organization is clear and coherent. Order and structure are present but formulaic.
- 3 - Attempt made to organize writing. However, the overall structure is inconsistent or skeletal
- 2 - Lacks structure. An occasional device is discernible. However, the writing is either difficult to follow or the piece is simply too short to demonstrate organizational skills.

- 1 - Writing lacks coherence. Organization seems haphazard and disoriented. Reader is confused.

Sentence Fluency

- 6 - Writing has an effective flow and rhythm. Sentences show a high degree of craftsmanship, with consistently strong and varied structure that makes expressive oral reading easy and enjoyable.
- 5 - Writing has an easy flow and rhythm. Sentences are carefully crafted, with strong and varied structure that makes expressive oral reading easy and enjoyable.
- 4 - Writing flows. However, connections between phrases or sentences may be less than fluid. Sentence patterns are somewhat varied, contributing to ease in oral reading.
- 3 - Writing is mechanical rather than fluid. Occasional awkward constructions force rereading.
- 2 - Writing tends to be either choppy or rambling. Awkward constructions often force rereading.
- 1 - Writing is difficult to follow. Sentences tend to be incomplete, rambling, or very awkward.

Nelson and Van Meter (2007)

Narrative Maturity

- 1 - Isolated description: description of people, places, and event without sequence or plot
- 2 - Temporal sequence: series of actions linked sequentially but with limited or no causality
- 3 - Causal sequence: series of actions related casually but with no implied planning or goal
- 4 - Abbreviated episode: Story with problem and stated goal or implied goal but with no clear ending
- 5 - Complete episode: Story with a problem, stated goal, explicit plans to solve the problem, and logical ending
- 6 - Multiple and/or embedded fully developed episodes

Ferretti, MacArthur, and Dowdy (2000)

Scoring Rubric for Persuasive Essays

- 0 - Response to topic. Paper responds to the topic in some way but does not provide an opinion on the issue.
- 1 - Undeveloped opinion. Paper states an opinion but no reasons are given to support the opinion or the reasons given are unrelated to or inconsistent with the opinion, or they are incoherent.
- 2 - Minimally developed. Paper states a clear opinion and gives one or two reasons to support the opinion, but the reasons are not explained or supported in any coherent way. The reasons may be of limited plausibility and inconsistencies may be present.
- 3 - Between standards for 2 and 4.
- 4 - Partially developed. Paper states an opinion and gives reason(s) to support the opinion, plus some explanation or elaboration of the reasons. The reasons are generally plausible though not enough information is provided to convince a reader. There may be some inconsistencies, irrelevant information, or problems with organization and clarity.
- 5 - Between standards for 4 and 6.
- 6 - Well developed. Paper states a clear opinion and gives reasons to support the opinion. The reasons are explained clearly and elaborated using information that could be convincing. May mention opposing opinion and give reasons against it. The essay is generally well organized and may include a concluding statement. The paper is free of inconsistencies that would weaken the argument.
- 7 - Elaborated and addresses opinion. Meets the criteria for previous level. In addition, the paper deals with the opposing opinions either with refutation or alternative solutions. Overall, the essay is persuasive.